

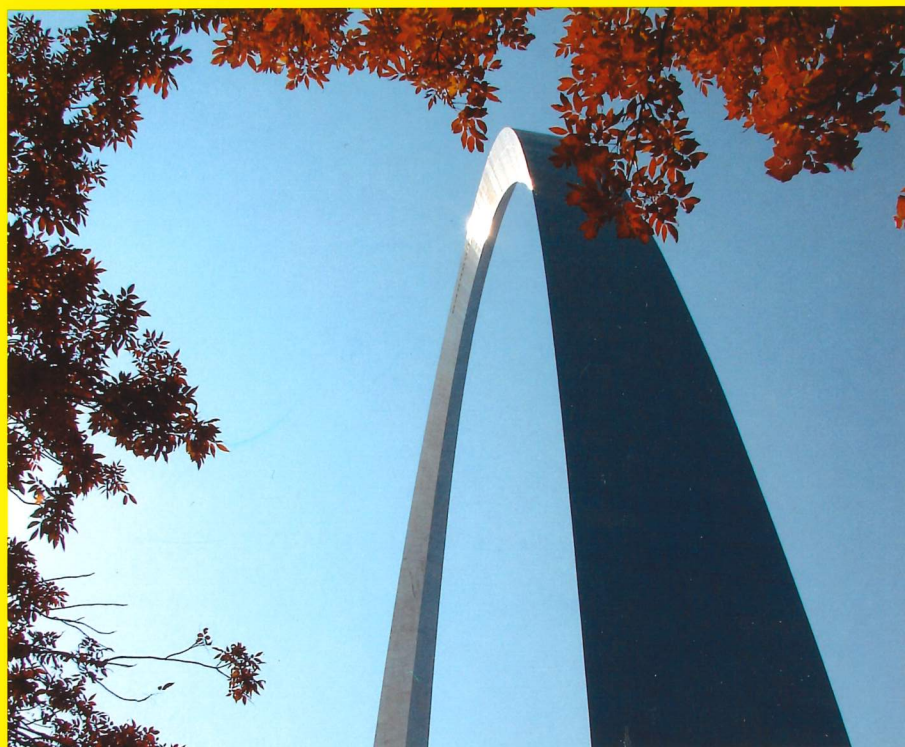
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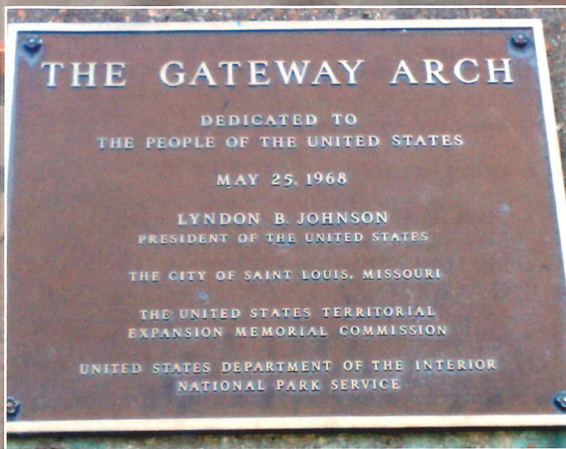
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Pierre Diakonoff, France



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VIBRATION DIAGNOSIS – EXPERIENCE FROM APPLICATIONS IN HYDRO POWER PLANTS

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ABSTRACT

The complex exciting loads and the large scope of dynamics especially in transient operation conditions make high demands on measurement, data processing and evaluation procedures. The interpretation and diagnosis of vibration behavior in particular requires enormous quantities of data. The HyCon vibration diagnosis system is capable of compressing large amounts of measurement data into a manageable and comprehensive set of information, thus enabling continuous monitoring and archiving, which in turn allows for long-term evaluation of machine conditions.

Furthermore, HyCon vibration diagnosis incorporates a deep comprehension of the functional relation between vibration causes and effects. It integrates the profound knowledge of hydrotechnology accumulated over decades of developing, manufacturing and operating hydroelectric machinery. In the event of abnormal vibration behavior, different error pattern probabilities are processed. This enables the causes of major known abnormalities to be clearly identified and recommendations on how to

proceed to be given. By remote connection to the power plant, a vibration expert can diagnose the system and offer online support on demand.

This remote diagnosis service can be especially helpful within the tight schedule of a commissioning process. A good example is the beginning of operations at the German Goldisthal pumped storage plant.

Here, vibration experts from the Voith Siemens Hydro Corporate Technology Center supported commissioning and guarantee tests from Heidenheim. The HyCon vibration system was installed alongside an existing vibration monitoring system. It was used as well for a synchronous unit as for a variable speed machine. With its high-resolution measurement data, the system was able to separate multiple influences on the vibration behavior of the units and to provide important information for evaluation and interpretation. HyCon vibration diagnosis has also been used to support the commissioning process of two new machines at the Portuguese Venda Nova II pumped storage plant. At all 12 Francis

turbines of Aswan High Dam in Egypt permanent HyCon vibration diagnosis systems are currently under installation while overhauling the units, and for each commissioning it gives a valuable feedback to the commissioning engineers about functionality of the new components and possibly optimized adjustments.

1. Introduction

A power plant's one and only objective is to fully meet the electricity demands for a maximum of time at the lowest possible costs. Efficiency is crucial. It is thus of highest importance that the machines are kept operating under optimum conditions. To ensure that, it takes a carefully adapted control system, a well functioning excitation system, and a powerful preventive maintenance tool working together in the most effective way. That is the reason, why the automated Voith Siemens Vibration Diagnosis is integrated into the Voith Siemens Hydro Control Family (HyCon) as an integral component of the 1. But also as a standalone system the technical principles of the advanced solutions and the equipment of the HyCon-Vibration Diagnosis System show their big benefits especially for commissioning and long term operation of Hydro Power Units. Vibration signals are sensitive and reliable indicators for the assessment of Hydro-Turbines and the evaluation of their machine state, if they are monitored and analysed with appropriate technique. To achieve reliable correlation of machine condition with vibration parameters the vibration signals have to be repeatable and significant. For such a high demand on quality signal post-processing and data archiving have to follow very special rules. During the commissioning of different Pump Storage Power

plants and Francis Turbines as well as for trouble shooting the HyCon-Vibration Diagnosis System could demonstrate its value several times, showing also the efficiency of a permanent monitoring and automated diagnosis for preventative maintenance.

2. Principles of Vibration Diagnosis

2.1 Standards

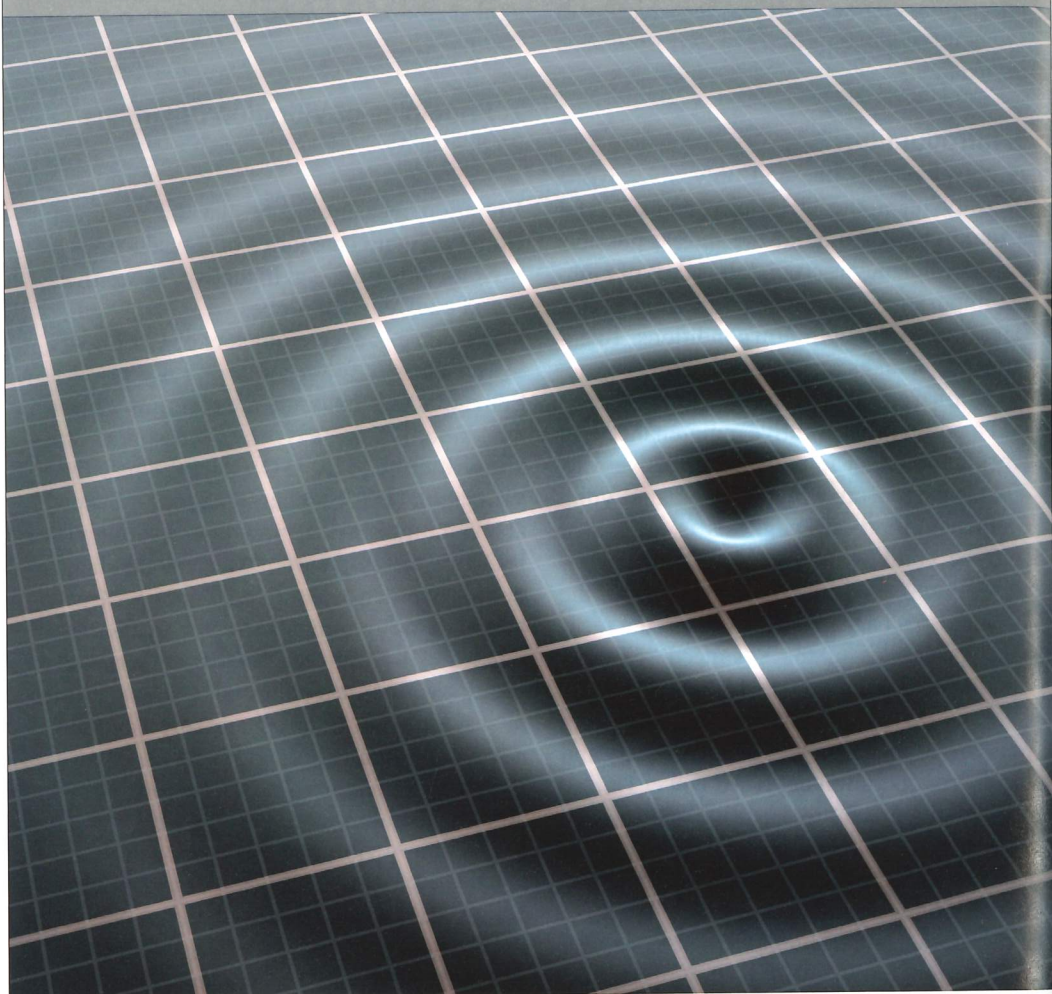
Vibration measurements may be obtained from two main categories of transducers:

- Non-contacting e.g. inductive, capacitive and eddy current probes
- Seismic e.g. accelerometers or velocity transducers

Standards to help assess the vibration severity for both of these types of measurements are written, e.g. by ISO (International Organization for Standardization). Acceptable vibration limits are described in the ISO/7919 series (5 parts) "Mechanical vibration of nonreciprocating machines – Measurements on rotating shafts and evaluation criteria" [1] and in the ISO/10816 series (6 parts) "Mechanical vibration – Evaluation of machine vibration by measurements on non-rotating parts" [2]. Both series are describing in their first parts the general requirements for measurement and evaluation of machinery vibration.

Especially for Hydro Machines the parts 5 are relevant for vibration reference levels. But the value and benefits of these standards are limited. In the ISO/7919 and ISO/10816 series of standards the evaluation procedures are dealing only with broadband measurements, without reference to frequency components or phase, and they do not take in account different operation conditions. But the experience especially with hydro machines

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shows that the vibration level is very much dependent on the actual hydraulic operation point, and a broadband vibration value does not indicate influences of different vibration causes. Also ISO 7919-5 does not differentiate individual bearing locations or distinguishes the turbine type. Some restrictions are also described even in the standards themselves. Both standards (ISO 7919 and ISO 10816) emphasize, that

- the numerical values specified are not intended to serve as the only basis for vibration evaluation, since in general the vibration conditions of a machine is assessed by consideration of both bearing housing and the associated shaft vibration.
- the numerical values specified can be taken as a basis for the evaluation of machines in the absence of any other established knowledge of the satisfactory running characteristics for such machines.
- the numerical values can be used to provide a basis for setting initial operational limits for alarms and tripping points.

To overcome the recognized difficulties, a Joint working group "JWG1" of *International Organization for Standardization* (ISO/TC 108/SC 2) and *International Electrotechnical Commission* (IEC/TC 4) are planning to revise both standards, ISO/7919-5 and ISO/10816-5, if a better data base of measured values with more detailed information about operation conditions and machine state will be available. New established vibration limits must consider type,

design and main operational parameters of the measured unit, the special operation condition at measurement and not at least the type and clearance of the respective bearing at which measurements had been made. The latter is important for the wanted relation of shaft vibration limits to actual bearing clearance. But even if these requirements will be fulfilled it is still clear for us that just with simple reference values the machine condition cannot be assessed reliable. Therefore the only way to give clear information about the state and possibly faults of a Hydro Power unit is to monitor, analyse and diagnose vibrations in a very specific way. For understanding the technical solution of the here used vibration diagnosis some other standards may be consulted:

ISO 13373-1:2001 Condition monitoring and diagnostics of machines - Vibration condition monitoring -

Part1: General procedures provide general guidelines for the measurement of machinery vibration for condition monitoring.

Part 2: Processing, presentation and analysis of vibration data [3]

There is a 3rd Part of ISO 13373 under preparation titled "Basic techniques for diagnostics", which will be developed as a set of general guidelines for the procedures to be considered when carrying out vibration diagnostics of machines. It is intended to provide some easy to use diagnostic tools, including diagnostic flow charts and cause-and-effect tables. But due to our experience those methods, drafting flow charts or failure trees or simple tables with relationships of cause and effect are not applicable to Hydro Machines, they even would involve the risk of strong simplification and of mistakes.

Therefore much more effort was spend in the programming of the *HyCon - Vibration Diagnosis* technique.

It is specially designed as a

⇒ **ruled based approach** with a combination of

- heuristic cause effect relationships,
- causal probabilistic fault models,
- and a mathematical model for the dynamic behaviour of the machine.

For closer definition see:

International Standard ISO/FDIS 13379
“Condition monitoring and diagnostics of machines - General guidelines on data interpretation and diagnostics techniques” [4]

2.2 HyCon - Vibration Diagnosis

One of the aims of condition based vibration diagnosis is to identify the individual healthy state of a machine as a basis to recognize an incipient damage and to optimize the operation mode [5], [6], [7]. To meet this demand vibration characteristic values are defined to recognize relationships and dependencies (kind of “fault patterns”) which are symptomatic for certain causes. The evaluation of vibration characteristic values refers to the rotor dynamic model calculation and to special pre-processed measured data. For an actual vibration condition fault probabilities are calculated, like unbalance, misalignment, anisotropic effects, and other phenomena... Even if a single fault probability value may not be so significant for an actual vibration cause these probabilities are powerful control parameters for the monitoring of trends and indicators for changes in machine condition. A special storage concept provides vibration characteristic values and fault pattern probabilities for long term evaluations.

The central core of the diagnosis system is a knowledge database where all necessary definitions are stored. The diagnosis process is very universal and can be expanded to the individual machine or by customer suggestions and requests for special fault patterns due to the own experience.

Some of the HyCon vibration diagnosis features are:

- Simultaneous processing of all phase synchronous measured signals allows the combination of vibration data for derived characteristic values
- The special storage concept assigns measured data to operation mode and ranges of process parameters
- The intelligent archiving method reduces the amount of data for long term storage and provides a high data resolution for a recent period
- Evaluation and diagnosis are controlled by a parameterized knowledge data base

In literature terms of vibration measurement, analysis and diagnosis are often ad-mixed. We distinguish between monitoring, that includes measurement and a certain depth of signal analysis, and diagnosis, that means the evaluation of a certain vibration condition and the relation to the root cause. This needs also a more sophisticated analysis and data acquisition system for providing diagnosis relevant characteristic vibration values. In figure 1 the steps from measurement to diagnosis are illustrated together with important aspects.

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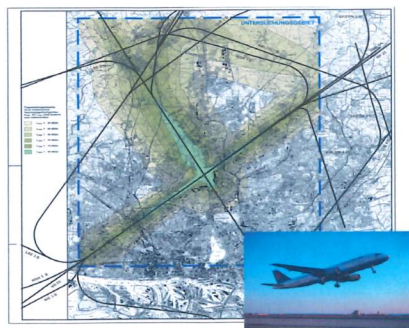
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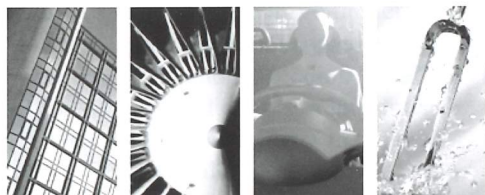


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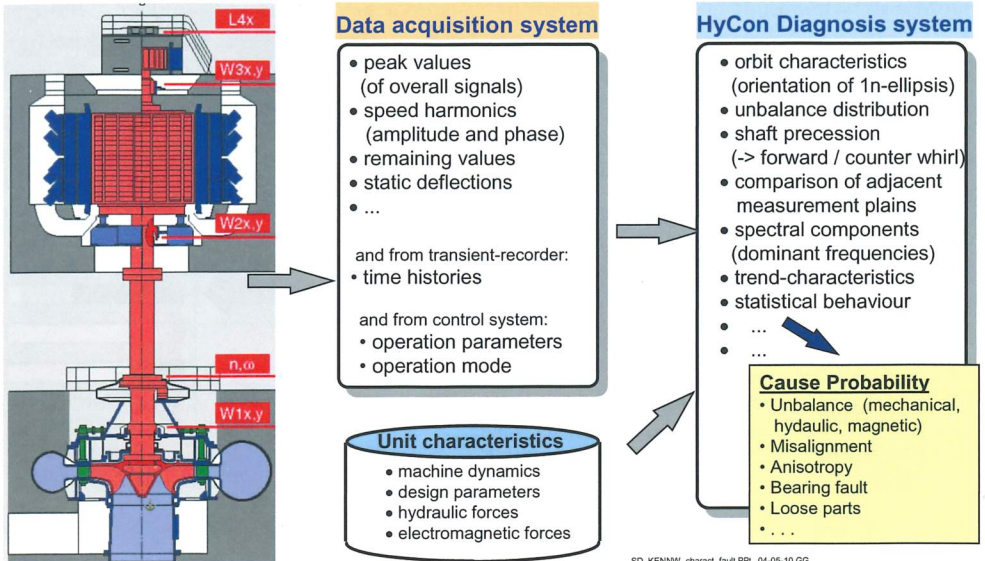


Fig.1: HyCon Vibration Diagnosis - Calculated characteristic vibration parameters for fault detection

Conventional monitoring systems usually provide only monitoring of one overall signal like the RMS (root mean square) value of bearing vibrations. Those information may be sufficient for the machine protection control, but that is far too general for evaluating conclusions for diagnostic purposes. Improved data acquisition and analysing systems like VIBROCAM5000 can store signals related to the operating mode (i.e. Turbine mode, Pump mode and Synchronous condenser mode). Those systems often provide filtered vibration signals by order analysis with components of rotating speed, their harmonics and a residual value. Beyond these features for diagnostic interpretation of vibration data in Voith Siemens Vibration Diagnosis system a deep comprehension of the functional relation between vibrations causes and effects is implemented. Therefore diagnostic relevant characteristic vibration values, associated with

operating parameters need to be classified by a precise combination of process data (like Guide vane opening, output, head, and speed for a variable speed unit). For diagnostic purposes the storage concept is decisive because the combination of process parameters is a multidimensional issue and operational influences on vibration values need to be separated. This intelligent archiving strategy is a basic function of HyCon. It will be explained in detail below with the example of Goldisthal application. The storage concept provides a high resolution of data in short time view while in a long term storage more and more averaged and compressed data are stored in files for weeks, months and years. Those long term statistics provide valuable trends for diagnostic parameters. The principle concept of the *HyCon - Vibration Diagnosis* is shown in Fig. 2

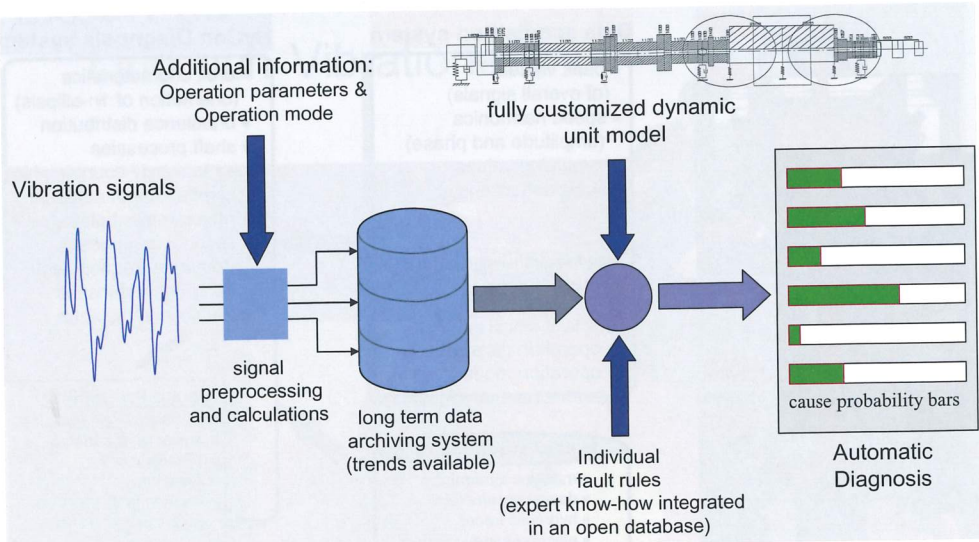


Fig.2: HyCon Vibration Diagnosis - Methodology for model based Diagnosis

3. Vibration Diagnosis installation on a 269 MW Pumped Storage Power plant

The Goldisthal pumped storage power plant is located in southern Thuringia, Germany, on the upper Schwarza river. Comprised of each two synchronous and two adjustable speed Pump-Turbines with a Head range of 279-334m and rated Turbine Output of each 269MW the Goldisthal plant is one of the largest and definitely the most efficient of the pumped storage power plants worldwide [9].

Vattenfall Europe Generation, the owner of that power plant with lots of experience in condition based maintenance [11] decided in an early stage to implement vibration monitoring as an important part of their safety and maintenance concept.

For this reason all four Pump-Turbine units of the pump storage power plant are equipped with relative shaft vibration sensors at three guide bearings and the thrust

bearing in axial direction, with absolute bearing vibration sensors as well at the guide bearings as with pressure transducers in spiral case, vaneless space and draft tube. In figure 3 the Goldisthal installation is shown as a combination of the conventional vibration monitoring system VIBROCONTROL4000 and the high sophisticated data acquisition and monitoring system VIBROCAM5000 (both supplied by Brüel & Kjær Vibro).

In VIBROCAM5000 the vibration signals combined with process parameters like active power or guide vane opening are associated with a certain operating mode are stored in the database [10].

To accompany the commissioning process and on customer request VSH (Voith Siemens Hydro Power Generation) installed the Vibration Diagnosis System in parallel to the existing monitoring system [12]. This can be seen in figure 3 (marked with blue boxes) as a combination of an additional

VIBROCAM5000 (for parallel data acquisition) with a special interface connected to the diagnosis system. This diagnosis system

in the power plant is equipped with remote operation and data access.

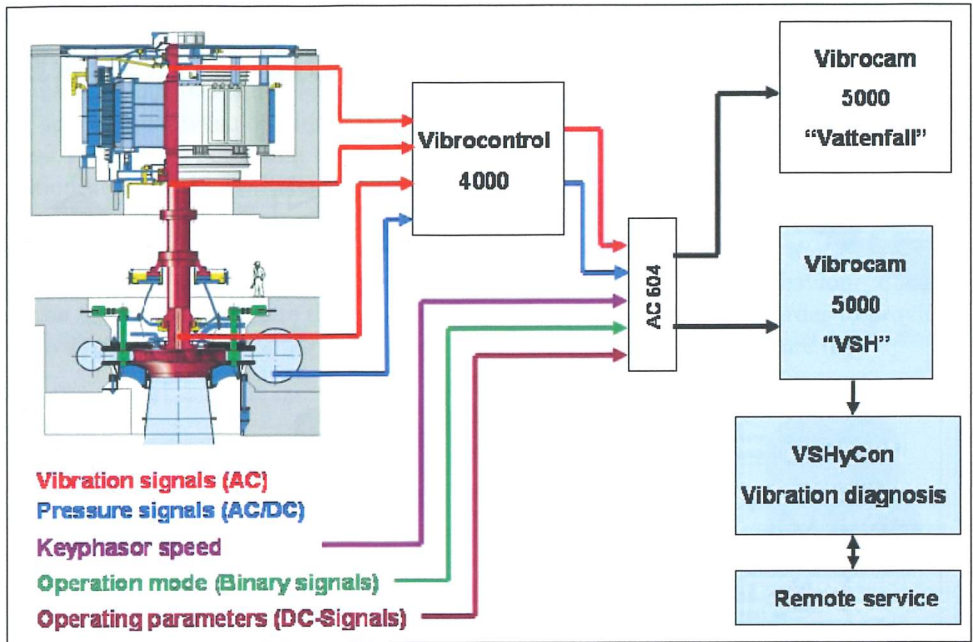


Fig.3: Installation of HyCon Vibration Diagnosis system in PSPP Goldisthal

After successful commissioning of the synchronous Unit C in PSPP Goldisthal with the parallel installation of HyCon to the existing VIBROCAM5000, VSH was ordered by Vattenfall to install the Vibration Diagnosis system also at Unit D (variable speed unit). That is why results are discussed here for those two units of the PSPP Goldisthal. The Voith Siemens Vibration Diagnosis system was installed in support of the Vattenfall Commissioning leader Dr. W. von Nessen-Lapp and results were discussed in close collaboration with him and other experts of Vattenfall Europe Generation in Goldisthal [13].

3.1 Storage concept applied for Goldisthal data

As an example for the high resolution of measured data in the short term mode figure 4 shows charts of relative shaft and absolute bearing vibration values, collected in the commissioning phase.

In three different variations the data are correlated to a specific operation parameter. The peak value of relative shaft vibration at three guide bearings is shown versus output (a), speed (b) and head (c) in Turbine operation for Unit D. On the right hand side of the diagrams the RMS-Value of bearing vibrations is also shown versus output (d), speed

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(e) and head (f). It is significant that all vibration quantities show a large scattering even they are already correlated to one operation parameter. This represents the typical situation in a Hydro Power Unit. The reason for this large scattering is that a certain output can be achieved by several combinations of head, speed, guide vane opening and other process parameters according to a certain operation point in the Hill chart. It is normal that different hydraulic operation points also indicate different hydrodynamic forces which result in different vibration levels. Even the approach to separate the peak values into 4 harmonics of rotating speed and a

residual value does not reduce the scattering significantly due to the variety of operating conditions. The only possibility is to correlate the measured data to two (2) operation parameters. This is shown in fig. 5, where data are selected for a certain range of head and speed. With this feature the Diagnosis module provides a very good reproduction of relative shaft vibration peak values (figure 5 a) and RMS values of bearing vibrations (figure 5 b) in Turbine operation. This approach is important to describe the characteristic vibration behaviour during commissioning process in order to provide a reference condition for future use.

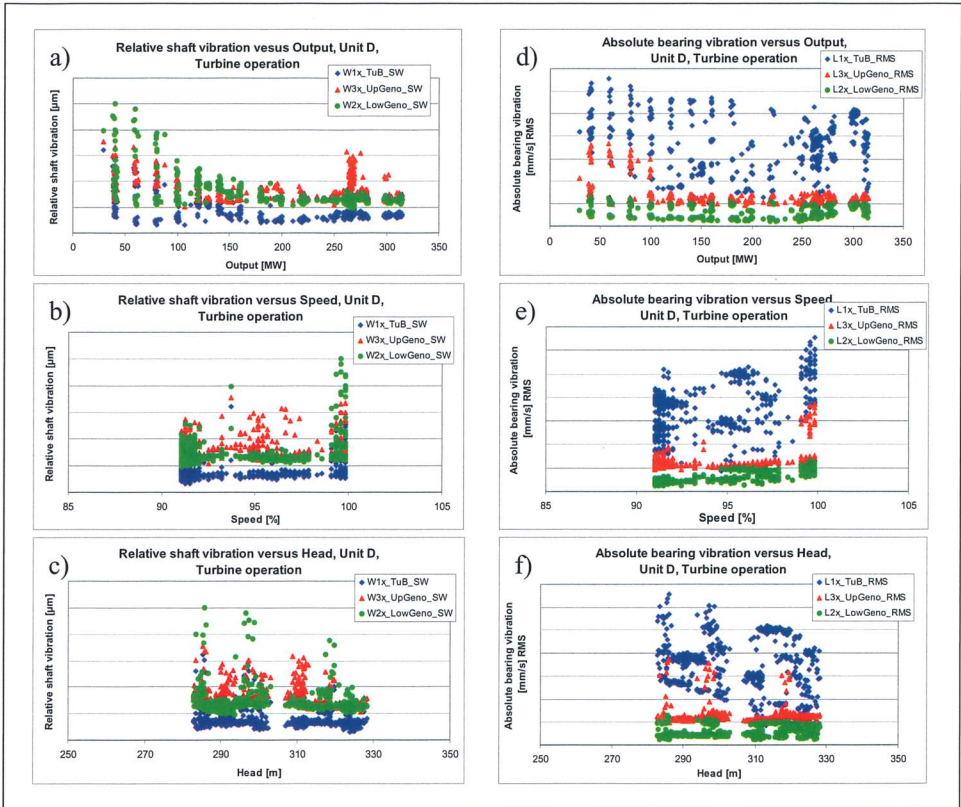


Fig. 4: Vibration data of Unit D for relative shaft and absolute bearing vibration

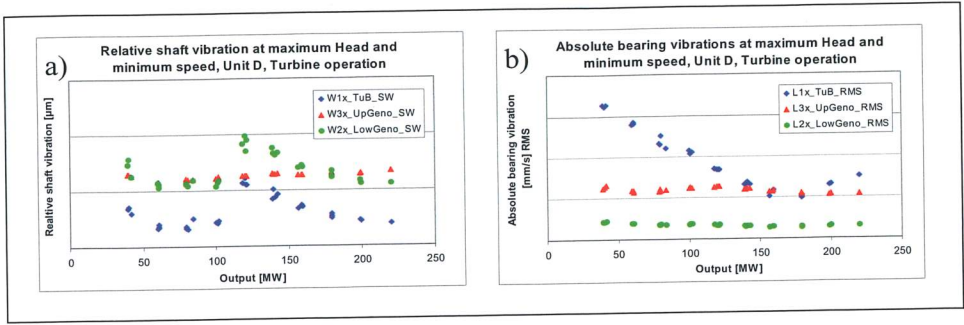


Fig. 5: Relative shaft and absolute bearing vibrations at maximum head and minimum speed

There were also thermal effects detected during the start up of both units. This is important to be considered for balancing procedures. It takes 20-30 minutes until a steady state condition is achieved and the reduction of vibration values at the upper Generator bearing from starting condition to steady state behaviour is nearly 50% of amplitude. Additionally as a further process parameter the oil temperature would be important information to narrow vibration values to steady state conditions.

3.2 Model based diagnosis

For a diagnostic interpretation of the measurements taken it is essential to know the dynamic characteristics of the machine as detailed as possible. The model calculation is usually performed with the multi purpose machine dynamic program "MADYN", a Finite Element based program system [8]. All necessary features are available for rotor dynamic effects, calculating as well as free vibrations as well as forced vibration with linear or nonlinear effects.

Once the rotor dynamic analysis model is calibrated and fine tuned by the feedback of the measurements it provides important information for the interpretation of meas-

ured signals.

The calculated natural frequencies of the shaft line system correlated with measurements are important indicators for the quality of the analysis model. It is important for the interpretation of dominant frequency components in certain operating conditions. Special transfer functions are defined to conclude from measured vibration signals to machine condition and exciting forces. One example is the unbalance evaluation. Based on measured vibrations signals of rotating speed component at various locations it concludes to the unbalances causing these vibrations.

A special effect recognized at Unit D was also correlated with analysis results. Due to some misalignment effects caused by a quite normal coupling flange skew between Turbine and Generator shaft a characteristic behaviour was recognized during coast down of that unit. At the upper Generator bearing the vibration amplitude decreased down to 150rpm. Below 150rpm the rotating speed amplitudes showed an increasing trend again. This effect could be explained by two phenomena. The rotating speed amplitude of the shaft vibrations mainly caused by unbalance forces usually shows a parabolic trend of amplitudes versus speed whereas



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coupling skew provides a different vibration behaviour. In the analytical model the responses caused by unbalances and coupling skew effects were generated separately and the resulting effect compared with the measurements to assess the severity of misalignment and coupling skew.

3.3 Automated fault detection

In Goldisthal the focus was set on short term commissioning application. In principle the automated diagnosis reaches the full effectiveness by detection of vibration causes, if data and relevant diagnostic values derived from measurements are stored from a longer observation time. For such a long term application it is more meaningful to configure the automatic fault detection. But already for data obtained in this shorter period an example for a special fault pattern can be shown in principle that is the anisotropy of the machine.

Anisotropic effects in guide bearings can be caused by looseness of support or wear effects. That makes it important for an early detection of such a fault. Special diagnostic parameters within HyCon are defined to indicate increasing anisotropy in bearings. The rotating speed vibration in each guide bearing in two directions can be reduced to the characteristic parameters of an ellipse. The ratio of the two main axes indicates the amount of anisotropy in the bearing. The orientation of this ellipse indicates the direction of anisotropy. Another indicator can be defined by the ratio of residual values in two measured directions.

In Goldisthal Unit D the ratio of ellipse main axes at the upper Generator bearing is nearly constant for all outputs in Turbine mode (figure 7a). Also the orientation of the main axes does not show significant scattering (figure 6b). The ratio of residual values in two directions is also very constant (figure 6c).



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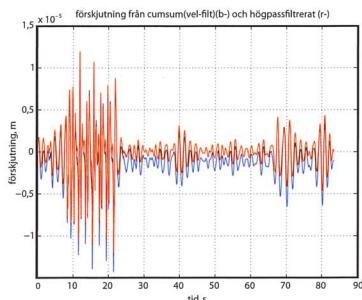
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Therefore the original condition of Unit D is slightly anisotropic and diagnostic parameters are very representative for the whole range of output. Those values are excellent indicators for long term trend evaluation

over weeks, months and years. A set of several diagnostic parameters combined to a fault pattern probability indicate long term trends very well [14], [15].

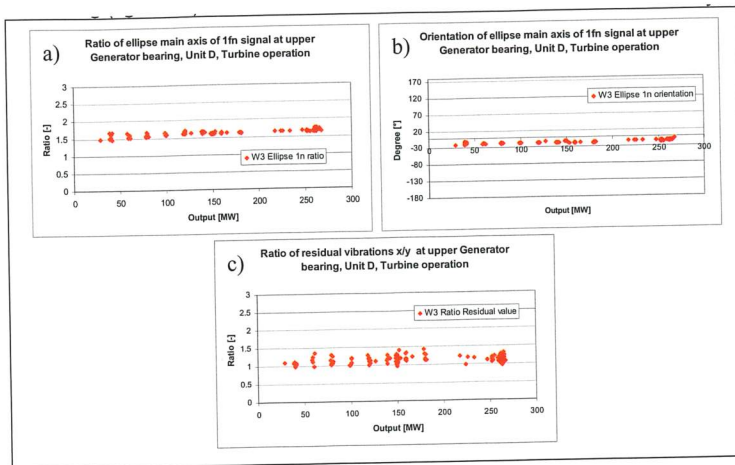


Fig. 6: Trend of diagnostic parameters versus output

4. Commissioning Support at 98 MW / 421 m – PumpTurbine

In Venda Nova II (Portugal) two synchronous reversible Pump-Turbines and Motor-Generators were built by Voith Siemens Hydro. Those Units with a Head of 422m and rated Turbine Output of each 97.1MW were commissioned in 2005.

Voith Siemens Hydro Power Generation performed remote analysis/diagnosis support in parallel to the on site commissioning activities with following goals:

- Balancing of both units
- Optimization of bearing clearances based on vibrations
- Define reference condition of vibrations ("Fingerprints")
- Remote service („Expert on demand“) during commissioning

Before starting balancing the first measurements showed a strange amplification for

the amplitude of the first harmonic ("1fn") - component of Generator shaft vibrations during coast down (at ~50% speed). The simultaneous phase shift indicates a resonance condition. So this phenomenon had first to be investigated.

This detected resonance amplification during coast down were than checked by numerical analysis with the machine dynamic program "MADYN" [8]. The rotor dynamic calculation model was fine-tuned with the observations of the first measurement results. Especial attentions had been paid for modelling realistic bearing stiffness by means of special finite element analysis, see figure 8. This model based approach is essential for our diagnosis technique and also necessary for actual trouble shooting. The theoretical investigations with the shaft dynamic simulation proved the measured vibration phenomena (see fig. 9) and found the reasons for the abnormal behaviour in a high dynamic sensibility on the bearing

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clearance at very low bearing load due to perfect alignment and small unbalance forces. It was concluded to reduce Generator bearing clearances to 58% of initial value. The expected effect was indeed that the resonance amplification in coast down disappeared. With this improvement of the

unit a prerequisite was fulfilled: with original bearing clearances the balancing was not possible because of scattering of 1fn amplitudes and phases of shaft vibration at nominal speed.

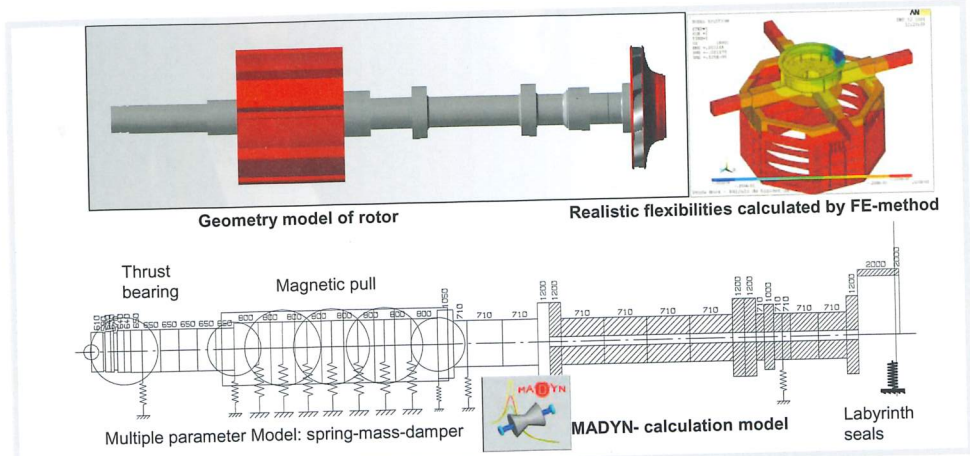


Fig. 8: Shaft line analysis for VN II for improved understanding of phenomena

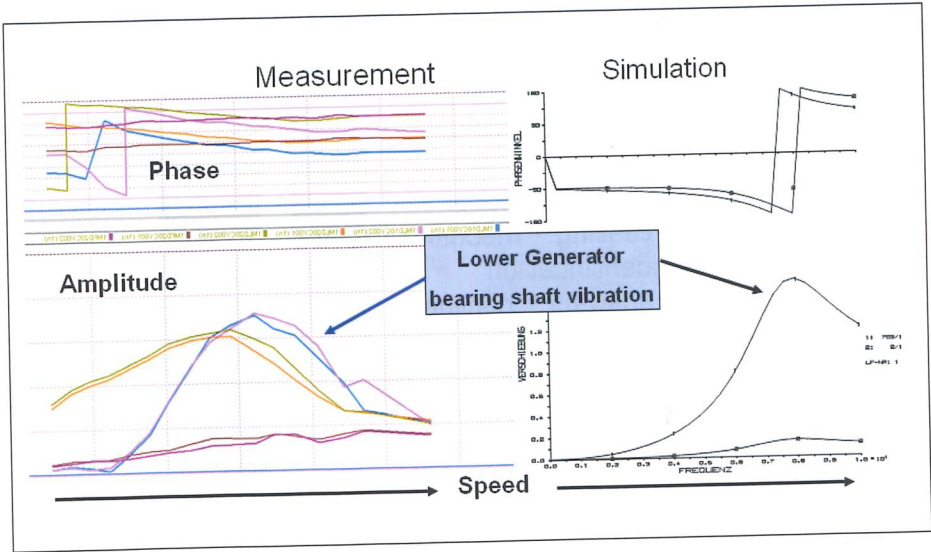


Figure 9 Coast down of 1fn signal in measurement and simulation

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Another difficulty appeared in preparation of balancing. Because the unbalanced forces are mostly detectable in bearing vibrations the signals of the sensors mounted on the bearing housings should be used. At Venda Nova for measurement of absolute bearing vibrations, accelerometers were first applied.

Unfortunately the acceleration signals showed some strange behaviour, and phantom trips without physical reasons appeared. The measurement loop was checked, but at last it was concluded that even for Units with 600rpm the signals of accelerometers were not useful for Hydro Turbines. As a consequence transducers were replaced by velocity probes.

The traditional way of balancing a rotor in a prototype requires a commissioning engi-

neer with expertise in balancing at site. If this service can be scheduled the balancing procedure can be completed in a matter of days. In reality usually delays occur. In Venda Nova II the first approach to balance the Units failed because of the resonance amplification mentioned above. Another time lag was caused by delays of a sub-supplier. Those unexpected events sometimes cannot be avoided during commissioning. In this case the approach of Voith Siemens Hydro was to balance both Units remotely. In practice the permanent commissioning team at site was responsible for the preparation and mounting of balancing weights. Based on measurement data from online access the experts in Corporate Technology provided information regarding size and location of weights on the rotor. Addi-

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tionally both Units had to be balanced two times because balancing condition changed after rough operating conditions. As a consequence for the conventional procedure a balancing expert would have travelled to the VN2 site at least for 4-5 times (for both units). At last the remote approach was successful; cheap and it also provided excellent flexibility, immediate response and well coordinated service on demand. With a well calibrated analysis model the HyCon vibration diagnosis provides also the possibility for automatic unbalance detection and trend evaluation of balancing condition.

The experiences from Venda Nova II from remote access for „expert on demand“ can be summarized:

- Reduction of experts at site ($\Rightarrow$ reduction of costs)

- Less effects of unexpected events on availability of experts because vibration experts need not be present at site ($\Rightarrow$ Flexibility!)
- Close interaction between commissioning team and experts in Corporate technology with detailed knowledge about actual machine behaviour ($\Rightarrow$ quick reaction time)

5. Temporary measurement on a 56 MW horizontal traditional Pumping / Turbining unit

Erzhausen is a conventional Pump storage power plant commissioned in 1965 with 4 horizontal units, see model in fig. 10. Each unit has a capacity of 56 MW at a head of 295 mWc and a speed of 428 rpm.

The motivation for a temporary measurement was the occurrence of high axial vibrations.

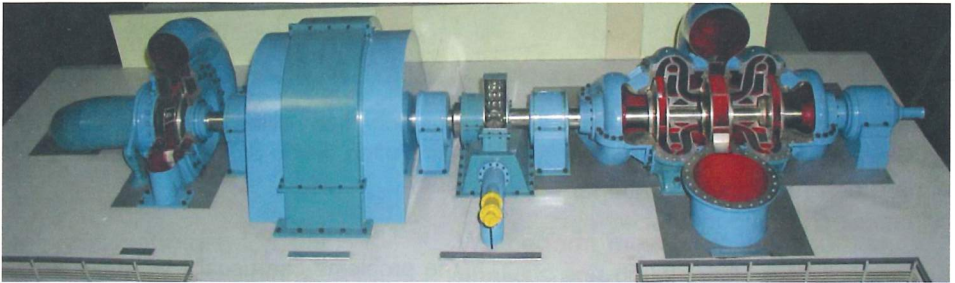


Fig. 10: Model of Erzhausen Pumping / Turbining unit

The Measurement consisted of:

- Relative- and absolute axial vibrations
- Head- and tail water pressure pulsations
- Operation parameters

It was essential to measure all dynamic quantities simultaneously and correlated to a common key phasor to achieve the phase information, because of assumed interrelationship between the reported vibration abnormal vibration phenomena and pres-

sure fluctuation. Exemplary time signals for pressure and axial vibration velocity are shown in fig. 11.

It could be easily stated that the vibration level were dependant from head- and tail water level. Further evaluation indicates a resonance vicinity of the mechanical and the hydraulic system. This was confirmed by theoretical investigation, see fig. 12. The final results of this individual diagnosis led

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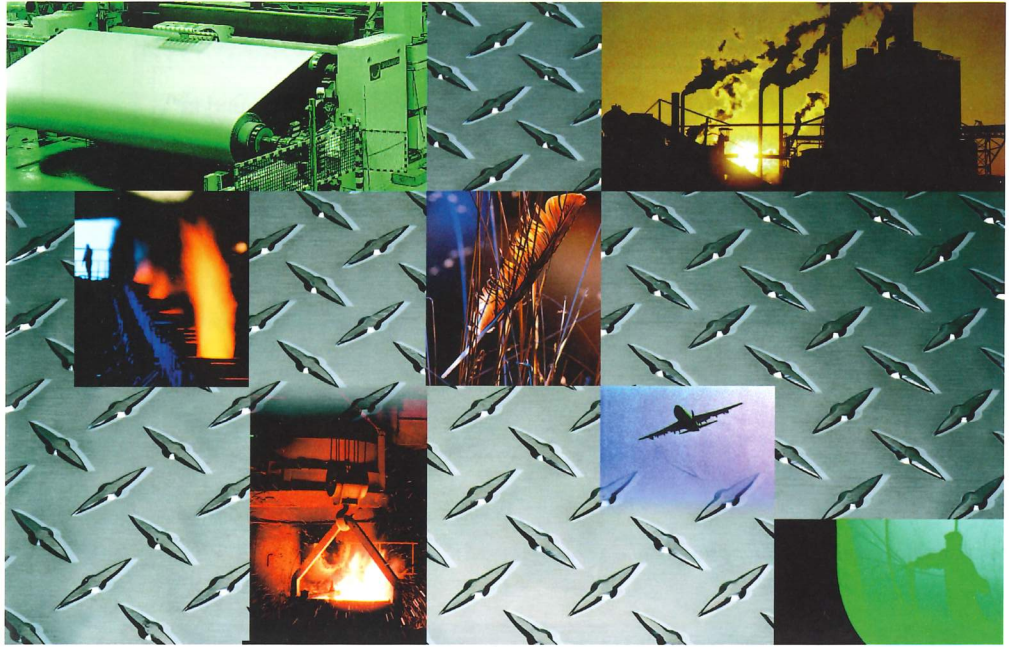
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to proposals for a specific operation, change in the aeration system and some other maintenance activities.

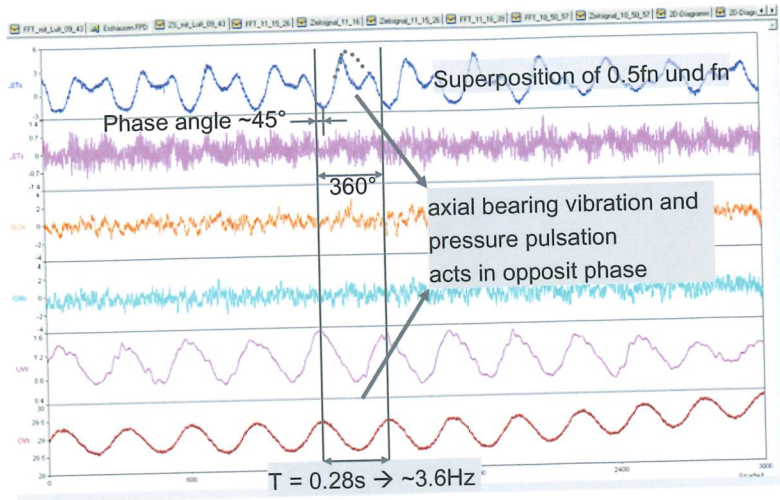


Fig.11: Exemplary time signals for pressure and axial vibration

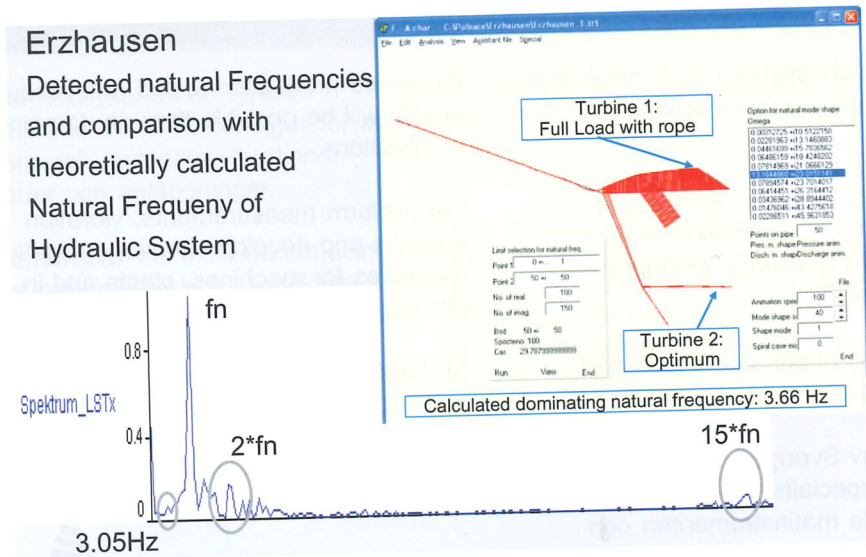


Fig.12: Comparison of detected frequencies with calculation of hydraulic system

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6. Permanent installation at 12 units of 180 MW Francis Turbines

This chapter describes the application of a permanently installed vibration monitoring and diagnosis system at the High Dam power plant of Aswan, Egypt in 2005 / 2006 which has been established during the modernization and refurbishment of its generators, see fig. 13.

6.1 General information and technical data

<i>Location:</i>	Aswan / Egypt
<i>Commissioning:</i>	early 1970's
<i>Machine type:</i>	Francis turbine, 12 Units
<i>Power:</i>	P = 180 MW
<i>Head:</i>	Hmax = 70 mWc
<i>Speed:</i>	n = 100 rpm
<i>Application:</i>	Permanently installed vibration monitoring and diagnosis system Temporary measurements (Unit 3 / 4), Balancing (Unit 9 / 10)



Fig.13: Aswan High Dam - site, model and power house with refurbishment of unit 9

6.2 Installation

The installation consists of a data acquisition unit of Delphin Technology, Germany, and, according to the requirements during operation (early fault detection, increase in

time between inspections), of the HyCon vibration diagnosis software module to perform automated long term diagnosis and failure detection, see fig. 16a. Based on pre-processed and compressed measurement data and a machine specific knowledge da-

tabase which among other contains a mathematical calculation model of the unit (model based approach) and defined fault patterns, the machine condition can be assessed and initiating failures can be indicated by corresponding probabilities.

6.3 Measurement device



Fig. 14: Measurement device Delphin Technology

As the new standard measurement device for fast analogue values (AC), a device from the TopMessage series of Delphin Technology is used in Aswan (fig. 14). This device and associated software was adjusted by Delphin Technology AG (Overath-Brombach, Germany) to the special needs of hydro power units and the HyCon vibration diagnosis. Slow changing process parameters and binary states are also

able to collect with the Delphin Technology devices. Furthermore there is the possibility to use digital or analogue control outputs to send internal calculated values or logic states. The measurement device has the facility to perform a closed conventional limit monitoring in terms of machine protection. With the

internal configurable monitoring logic, limits

in relationship to the actual operation point can be defined, to trip a control output. Beside the fast data acquisition (useful sample rates per channel up to 20 kHz) the calculation of characteristic values (average,

Smax, harmonic,...) is processed in real-time. Further external investigations can be performed under use of the cyclic available time signal.

The internal device memory, expansion up to 1GB, allows the use as a flight recorder (up to 128 mio. values). Herewith a complete signal history in a limited time range or an event triggered recording is possible.

Additional features of the Delphin measurement device are:

Hardware interface

- galvanic isolated differential input (no additional electrical isolation)
- signal conditioner (no additional measuring transducer)
- sensors can be calibrated
- synchronous / parallel analogue input sampling (up to 20kHz / 24 Bit)
- digital signal processor with internal memory
- event driven time signal recording up to 8K points/channel
- digital input filter up to 10. order
- analogue input for slowly changing values (DC) and digital input
- digital and analog control Outputs

Integrated functions

- characteristic values in real-time (peak to peak, gap, order analysis)
- FFT analysis in real-time (1600 lines)
- configurable limit monitoring with control output
- calculation channels
- integrated alarm system (SMS, Email)
- online parametrizing
- Ethernet communication interface
- Extendable through modular device construction

6.4 First feedback while commissioning

Prerequisite for the definition of fault patterns and knowledge database is some base knowledge about the machine. The behaviour of the Aswan prototype was investigated during its commissioning with a Delphin analysis tool to perform a manual analysis of vibration and operational data gathering with an increased resolution. For an exam-

ple of Visualization with the Delphin System see fig. 15. Because of the derivation of fault patterns and basic behaviour of the unit this phase is also understood as training or teach-in process of the automated diagnosis module of the HyCon software which leads to a well adapted solution for Aswan High Dam. The system is thus able to trigger alarm signals or inform on the health status of the machine in a reliable way.

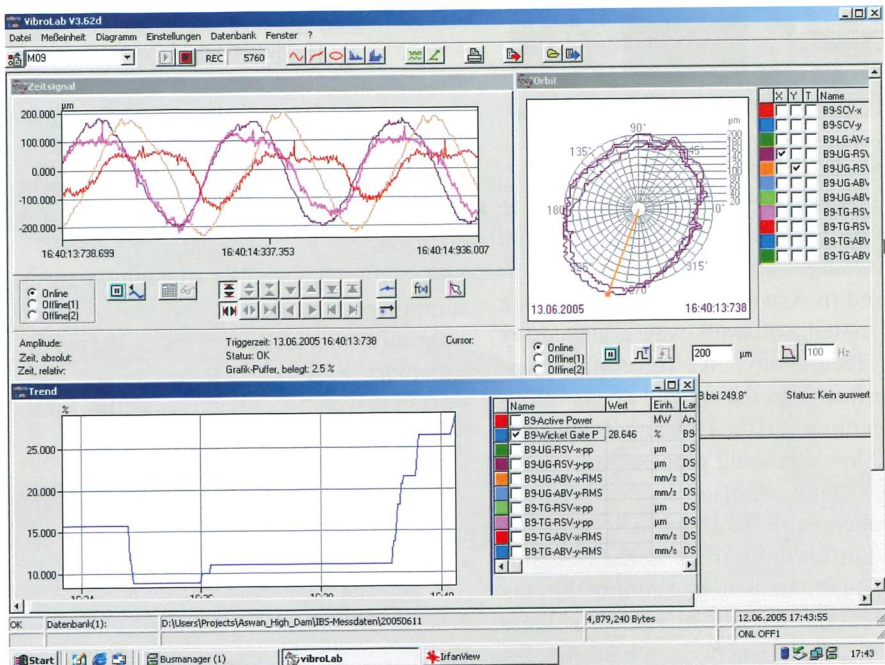


Fig. 15: Example Aswan Unit 9 - Visualization with Delphin System

During the commissioning of Aswan High Dam the trend analysis of shaft vibrations over about 5 hours combined with the measurement of bearing temperatures leads to the detection of a misaligned thrust bearing cover seal. Locally high temperatures lead to shaft deflections reflected by the increased shaft vibrations at the turbine guide bearing. By increasing the clearance be-

tween cover seal and shaft the temperatures as well as the vibrations could be reduced and the trend of the shaft vibrations showed a stable behaviour. Without commissioning supporting measurements the defect would not have been detected in such an early stage and the complete seal could have been damaged.

6.5 future measurement chain

In Aswan the machine protection by controlling vibration values for trip and alarm limits is covered, as usual, by a Vibrocontrol 4000 (B&K) unit.

Due to the very good experience with the new measurement device from Delphin the

standard for new installation will be according fig. 6b. That means that also the task of machine protection and conventional monitoring is covered by Delphin equipment in future. The first application will be at 8 Francis Turbines (each 73MW output) in India.

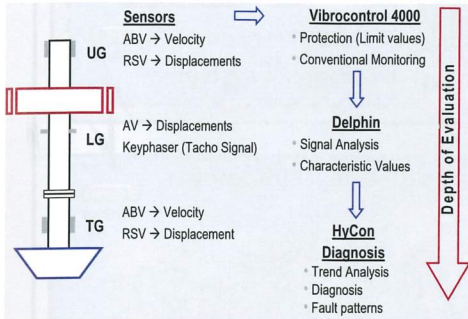


Fig. 16a: Aswan High Dam - Measurement Chain

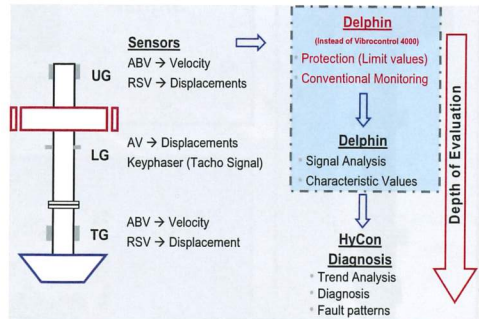


Fig 16b: Future Measurement Chain

7. Service by remote diagnosis

The success of the HyCon Vibration Diagnosis installation in different power plants was also ascribed to a service oriented aspect. Per Modem connection experts of VSH from Corporate Technology Center in Heidenheim had online access to the system installed in the Power plants whenever both sides regarded this as necessary. For the customer several benefits resulted from this configuration:

a) An important benefit is to have redundant experts for special measurements during commissioning.

Especially for guarantee tests if customer personnel are currently not available the remote measurement expert can be hired by call.

b) Remote expert diagnosis (remote balancing, vibration assessment and optimization,

...) is an efficient way of supporting commissioning with high flexibility.

c) Another benefit is the online access to the data for specialists of the manufacturer. The assessment of an "expert on demand" is very important during the tight time schedule of a commissioning process especially if support is needed based on knowledge of measurement data.

The technical installation including sensors, hardware, software, various signals and online connection is mandatory for this approach. A typical installation is shown in figure 17. For a permanent vibration monitoring and diagnosis installation all components are within the scope of supply. In case of temporary installation of vibration diagnosis system some equipment needs to be installed before commissioning process starts and will be removed after commissioning.

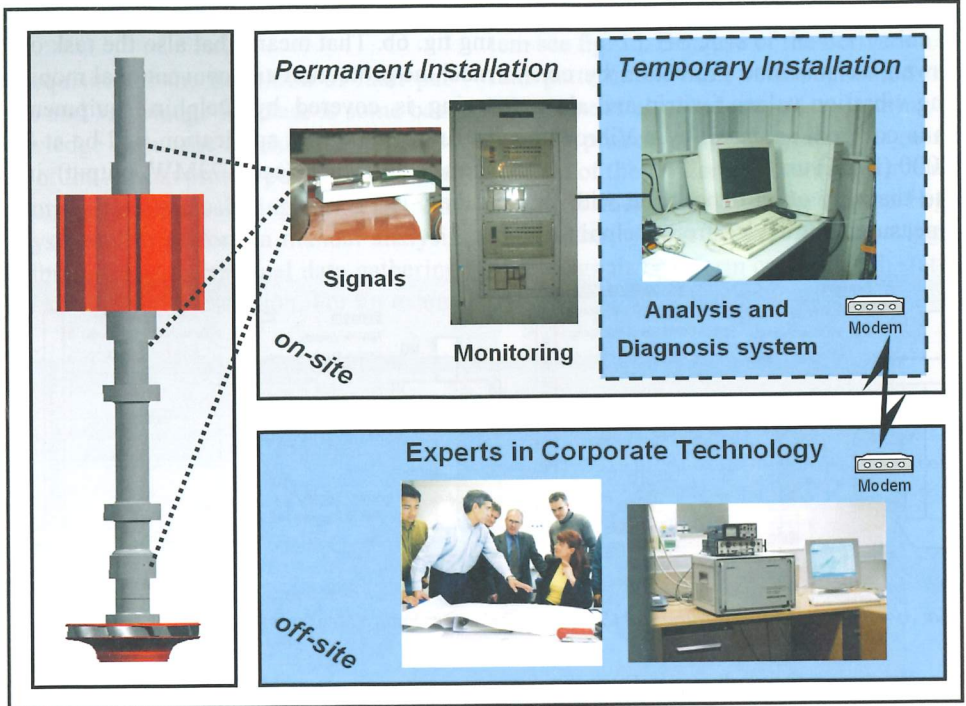


Fig.17: Installation of remote diagnosis in Venda Nova II

8. Conclusion

The different HyCon installations confirmed the effectiveness of the used vibration diagnosis. Benefits of HyCon Vibration Diagnosis could be proved:

- The automated Vibration Diagnosis system was able to separate multiple influences on the vibration behaviour of the units.
- The storage concept of vibration diagnosis system fulfils requirements for commissioning process and long term condition based maintenance.
- A reference condition („Fingerprint“) for the characteristic vibration behaviour of the unit is defined
- The model-based diagnosis is an appropriate platform for Condition Based Maintenance
- The model based approach provided important information for evaluation and interpretation of measured data
- The automatic fault detection provides clear, compressed basic information about the machine condition to the operator
- Customer support by experts of the manufacturer and remote service by “Expert on demand” is an integral part of the diagnosis concept.

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Johan Granlund är ordförande i SVIB AU 4. I alla fall var han det när jag sist talade med honom. Han har dock försökt hitta någon som kan överta ansvaret för SVIB AU 4 eftersom han fått så mycket att göra med Roadex-projektet av vilket en del beskrivs i följande artikel, Alf Olsson

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Mats Jonsson vid ratten under vibrationsmätning

asfalt som ger olika väggrepp under vänster och höger hjul och därmed sladdrisk vid hård bromsning. Det är många typer av fel på vägbanan som tillsammans gör att lastbils- och bussförare i skogslänen lever farligt på jobbet.

Yrkesförare i EU's norra periferi (inkl svenska Norrland) kan skadas av att många vägar är dåligt underhållna. Det visar en ny rapport från Vägverket Konsult. Sedan tidigare vet man att yrkesförare drabbas oftare av ryggbesvär och stressrelaterade hjärtsjukdomar. Enligt Arbetslivsinstitutet löper lastbilsförare i Norrland tre gånger så stor risk att drabbas av stressrelaterade hjärtsjukdomar än andra svenskar. Trafikolyckor är ett annat faromoment. Risken att dödas i motorfordon är 2,5 gånger högre i glesbygd än i storstäderna, enligt Folkhälsoinstitutet.

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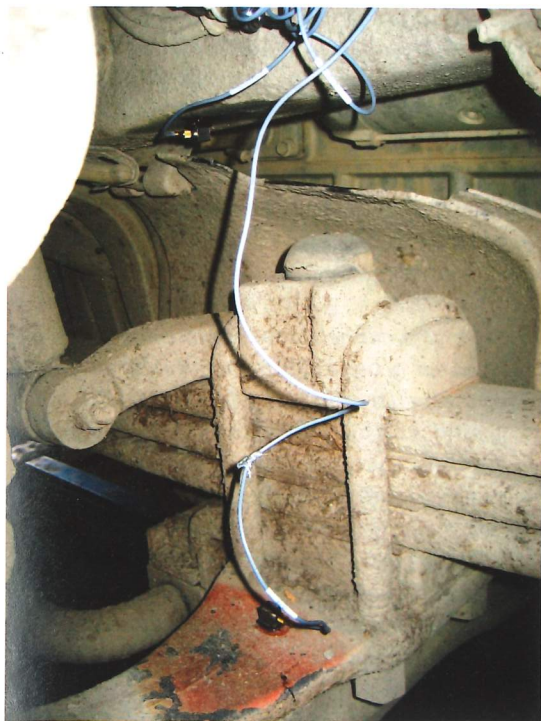
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Ett problem är att arbetsmiljöregelverket är fokuserat på arbetsgivare och arbetstagare, medan ansvaret för den som råder över förhållandena på arbetsstället – t ex väghållare – i vissa stycken inte är lika klart definierat. Enligt regelverket är väghållarens ansvar solklart när man väl beslutat utföra vägarbete. Däremot är väghållarens ansvar för vägnas befintliga skick tyvärr inte lika tydligt reglerat. Min förhoppning är att det kommer att se annorlunda ut om tio år. Vägnätet är så stort att det kommer ta lång tid

att genomföra rätt åtgärd på alla platser. säger Johan Granlund. Han deltar för Vägverkets räkning i ett internationellt samarbete med syfte att höja kvaliteten på de lågtrafikerade vägarna i EU:s Norra Periferi, det s k Roadex-projektet.

Vad kan då åkariägare och förare göra? Sänkt fart och byte av fordon är som regel mycket mindre effektivt än att jämna till vägbanan. Låt därför förarna mäta vibrationerna, för att se var problemen är värst. Skicka in resultaten till berörda väghållare, uppmanar Johan Granlund. Numera kan man hyra in portabla utrustningar för att mäta färdvibration på förarens sits, samtidigt som man med GPS registrerar fordons fart och var på vägnätet problemen är värst. Sådana mätningar kan illustrera ojämnheter i vägbanan. Metoden kan också fånga upp grövre brister i vinterväghållningen. Vägverkets egna

mätningar sker nästan uteslutande på isfri, otjälad sommarvägbana och endast undantagsvis på grusvägar.

Resultaten från Roadex är högtintressanta, framför allt för att de kan spara pengar åt vägmyndigheter och näringsliv. I projektet har Vägverket tillsammans med partners från Sverige, Norge, Finland, Island, Grönland och Skottland fokuserat på drift och underhåll av det lågtrafikerade vägnätet i tre delprojekt under åtta års tid. Målet var att ta fram långsiktigt hållbara transportlösningar på det lågtrafikerade vägnätet i samarbete mellan parterna. Flera andra länder, däribland USA, Ryssland och Japan, har visat stort intresse för projektet. Roadexprojektet anses vara ett av Europas bästa, och har nu av EU Interreg Northern Periphery Programme nominerats till utmärkelsen RegioStars 2009 - The Awards for Innovative Projects.

Ibland blir man över hövan hörsammad. Klockan är nästan 6 på kvällen här i St Louis och långt över midnatt hemma i Skandinavien och då plingar följande meddelande från Leif Nielsen in i mailboxen. "Hej Alf, Hermed endelig mit bidrag til en artikel i SVIB NYT". Leif arbetar på Dansk Standard. Han sekreterare i TC 108 SC 3 Mechanical Vibration and Shock – Use and calibration of vibration and shock measuring instruments. Torben Liecht, B&K är ordförande. Vi deltog i TC 108 mötena här i St Louis förra veckan.

Jeg er klar over, at det måske er alt for langt men jeg var jo alligevel ved at skrive rapporter fra møderne - og jer ser i øvrigt, at du jo også har brugt ganske mange ord i din henvendelse til ISO! (se videre på annan plats i SVIB-Nytt)

Men det betyder, at de er meget velkommen til at bruge det helt, som det nu bedst passer i SVIB nyt. Specielt kom jeg pludselig til tænke på, at netop SVIB nyt måske var et passende sted for den lille historie om Sven Eskilsson, men det er jo rent fyld uden relation til møderne i St. Louis.

Grundlæggende er den danske deltagelse jo nu så svag og fokuseret på nogle ganske få specielle områder, at vi ikke længere har nogen samlet gruppe, som har et kvalificeret synspunkt på hele organisationen af TC 108. Personligt er jeg helt enig i, at man skal passe meget på med at rode rundt i noget, som fungerer godt, også selv om det ikke passer helt perfekt eller naturligt ind i en eller anden systematik, som man kunne tænke sig. Men jeg vender snarest tilbage med eventuelle flere synspunkter på det. Hilsen, godnat herfra og fortsat god fornøjelse/arbejdslyst i St. Louis.

INPUT TIL ARTIKEL TIL SVIB OM MØDERNE I ISO 108/SC 3, 2008 I ST. LOUIS, USA

ISO/TC 108/SC 3 "Use and calibration of vibration transducers" meets in St. Louis, USA
ISO/TC 108/SC 3 held its 29th meeting in St. Louis USA together with the main ISO/TC 108 committee. Though in principle the instrumentation standards of SC 3 serve as basis for almost all of the measurement standards of both SC 2 and SC 4 - though formally not referred to in all of these - it is practical for SC 3 to meet together with the main TC 108 because there is a large overlap of WG members between the WGs of SC 3 and TC 108.

Swedish leadership in transducer calibration
Most of the activities of SC 3 are taking place in WG 6 on calibration of accelerometers. WG 6 actually started its activity many years ago under the leadership of Sven Eskilsson from SAAB in Sweden. Creating an exceptionally good and professional working environment which soon attracted a number of the world's leading experts from primary calibration laboratories notably in Germany, USA, Denmark, South Africa and Japan Sven managed to very efficiently lead the development of 19 impressingly short and focused standards, the ISO 5347 series, which established all of the basic calibration methods for vibration transducers. Having

completed this work Sven resigned and the convenorship was taken over by the chairman of TC 108, Bruce Douglas, USA. Many of the original standards actually continue to be confirmed and therefore still exist under the original number, but the ongoing updating and development of these important basic standards in WG 6 is carried out under the new number ISO 16063.

Results of 2 day WG 6 meeting on calibration

Testing of transverse vibration sensitivity (DIS 16063-31) and Calibration of laser vibrometers (CD 16063-41): after successful DIS and CD votings the German project leader for these projects had very carefully prepared drafts for actions on the comments as well as revised drafts which were presented and carefully discussed. As a result final texts for were actually prepared at the meeting and approved at the subsequent SC 3 meeting for FDIS and DIS circulations.

Calibration of seismometers (PWI 16063-42): discussion of a proposal from Japan concerning seismometers for the detection of earthquakes revealed that this type of transducers is actually not well known outside Japan, so there is clearly an educational process needed before this can be developed into a broadly based international standard. The item was therefore kept at the preliminary stage, and the Japanese project leader was asked to provide information and explanatory material for the next meeting.

Two other projects concerning *Resonance testing (PWI 16063-32) and Angular vibration calibration by comparison to reference transducers (PWI 16063-23)* had to remain at the preliminary stage because there are at present no one available or willing to take lead of these items.

Vilka givare behöver Ni?



Piezoelektriska,

Accelerometrar 1-ax, 3-ax
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Piezoresistiva,

Tryckgivare
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An upcoming method from PtB in Germany was a proposal concerning *Parameter identification of accelerometers by primary methods (PWI 11362)* which was also kept at PWI level, but it was foreseen that it can be activated at the next meeting.

Another presentation was made by the project leader from PtB on *Dynamic force transducer calibrations (PWI 21691)*, but it was also kept as PWI, and an actual WD will not be prepared until the method has been further validated.



Susan Blaeser, Secretary ISO TC 108

the high levels of SMB and TMB in IEC and ISO so the result of the meeting in St. Louis was yet another resolution suggesting to IEC that the IEC document should be edited to refer to ISO/TC 108/SC 3 standards and that any further calibration methods - if really considered necessary - should be developed in cooperation with ISO 108/SC 3.

Request from TC 108/SC 2 for Instrumentation assistance
In addition to WG 6 there is a WG 10 of TC 108/SC 3 on

condition monitoring instrumentation and procedures. It has actually been working on this around 10 years at the preliminary level without reaching a result i.a. due to continuous change of project leaders and to insufficient manpower. At the last meeting, however, the WG got a specific task from TC 108/SC 2 to revise ISO 2954 on Requirements for instruments for measuring vibration severity on rotating machinery which is from 1975 and technically outdated, in order to update it to provide the instrumentation basis for the ISO 10816 and 13373 series on Evaluation of machine vibration by measurements on non rotating parts and Vibration condition monitoring prepared by TC 108/SC 2/WG 1. At the meeting in St. Louis it was realised that an original plan to include the ISO 2954 revision in a more encompassing standard originally foreseen was much too ambitious, considering the available – or lack of - manpower and resources,

Finally, much time was spent on a draft prepared by a former member of WG 6 from Japan who, after his resignation from WG 6, has initiated the preparation of a draft for an IEC standard within IEC/SC 47E on *Discrete semiconductor accelerometers* claimed to be particular to semiconductor accelerometers but which actually reproduces a number of the basic calibration standards prepared by ISO108/SC 3. This has already been discussed at length at earlier meetings. Most experts think that there is no need for such particular calibration methods for semiconductor accelerometers and that this is just an attempt to get a proprietary method published, so SC 3 feels, of course, that the already existing standards of SC 3 should simply be referred to in the IEC document. Personal controversies have not made it easier to find a compromise solution. Actually, the question has even been brought up to

which is in March 2009 in London.

Instrumentation for measuring human response to vibration

In addition to these items SC 3 dealt with a number of reviews, notably of ISO 8041 on Human response to vibration – Measuring instrumentation. Only Germany had submitted a number of suggestions for improvements and corrections. The result was that the German delegation was asked to submit a proposal to the secretariat for only a technical corrigendum.

National metrology institutes are using TC 108/SC 3 standards

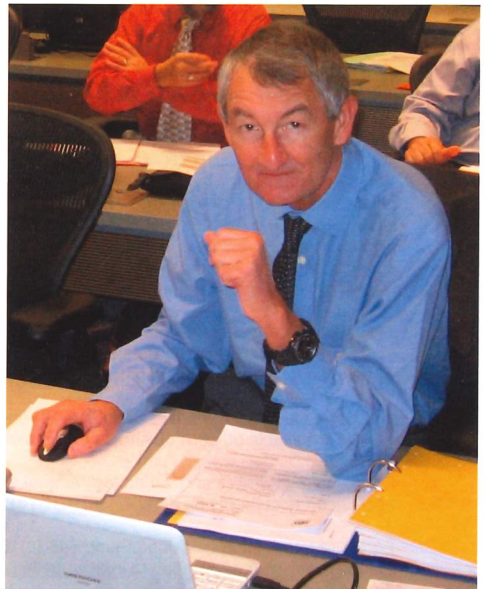
Through a personally appointed representative TC 108/SC 3 has a very close liaison with the CCAUV of BIPM and the very basic laser accelerometer calibration standard developed in TC 108/SC 3 has been the basis for several very successful key comparison calibration testing within CCAUV under his leadership. He had prepared a detailed report on the status and progress of work of TC 108/SC 3 to the last meeting of CCAUV. This report which was also presented at the SC 3 meeting gives a very good overview of work of TC 108/SC 3 on transducer calibration is available upon request from the TC 108/SC 3 secretariat (len@ds.dk) for anyone interested.

Next meeting

TC 108/SC 3 is expected to join TC 108 also at its next meeting which may be organised together with all of the subcommittees of TC



108. However, if this will be too long ahead, a separate meeting of SC 3 or possibly only of the WGs may be necessary to ensure the progress. In this case the conference of IMECO in September 2009 where a number of calibration experts will be present anyway was considered as an opportunity.



Charlottenlund 2008-11-11

*Leif Nielsen Danish Standards
Secretariat of ISO/TC 108/SC 3*

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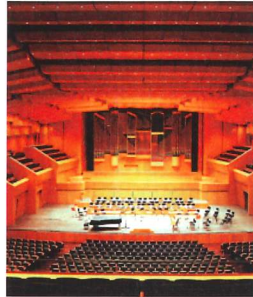
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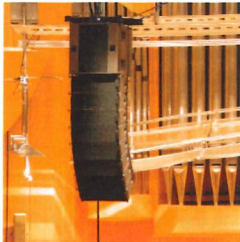
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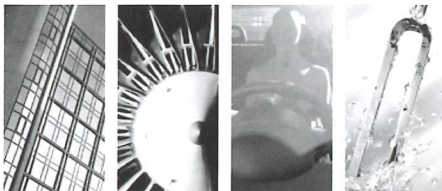
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Kurser, Konferenser och Läsvärt

I slutet av oktober fick vi detta meddelande från Malcolm Crocker. På min fråga om deadlines för abstract kommer att hållas eller förlängas säger han att det inte är bekräftat men sannolikt kommer att ske. Alf Olsson

Dear colleague:

We have the pleasure to warmly invite you, together with accompanying persons, to participate in

the 16th International Congress on Sound and Vibration (ICSV16) to be held in Krakow, Poland, 5 - 9 July, 2009.

We hope that you will submit an abstract and present a paper at the Congress. Abstracts (300 words maximum) can now be submitted directly to www.icsv16.org

ICSV16 is expected to be one of the largest congresses in the world in the fields of acoustics, noise and vibration, with more than 1000 participants from over 60 countries. Therefore, it will be a major opportunity for you to present your latest scientific and experimental results, advertise your company and products, and learn about the most advanced theories, technologies and applications.

ICSV16 is organised under the auspices of: International Institute of Acoustics and Vibration (IIAV), Committee on Acoustics of the Polish Academy of Sciences, Polish Acoustical Society (PTA), AGH University of Science and Technology, Silesian University of Technology, in cooperation with: European Acoustics Association (EAA), International Union of Theoretical and Applied Mechanics (IUTAM), American Society of Mechanical Engineers International (ASME International), and the Institution of Mechanical Engineers (IMechE).

There will be seven keynote papers presented:

- "Ultrasonic Imaging Using Multitone Nonlinear Coding," Andrzej Nowicki, Janusz Wojcik, Wojciech Secomski, Warsaw, Poland
- "Transmission and Gearbox Noise and Vibration Prediction and Control," Jiri Tuma, Ostrava, Czech Republic

- "State of the Art Beam-forming Software and Hardware for Applications," Samir Gerges, Florianopolis, Brazil, Robert P. Dougherty, Bellevue, USA
- "Approaches for Structure-borne Sound Source Characterisation," Bjorn Petersson, Berlin, Germany
- "Acoustic and Vibration Exposure and Comfort inside Urban and Extra-urban Transportation Systems," Luigi Maffei, Naples, Italy
- "Active Sound Control in Vehicles and in the Inner Ear," Steve Elliott, Southampton, UK
- "Machinery Diagnostics and Machinery Health Monitoring," Bob Randall, Sydney, Australia

During ICSV16 you will also be offered rich social and tourist attractions, and have the opportunity to experience Polish hospitality, culture, and famous food known worldwide.

Krakow has traditionally been one of the leading centres of Polish scientific, cultural and artistic life. The intellectual potential of Krakow is created by 22 universities, nearly 20,000 academic lecturers and 190,000 students. As the former capital of Poland with a history encompassing over a thousand years, the city remains the spiritual heart of Poland. It is a major attraction for local and international tourists and welcomes seven million visitors annually. In 1978, UNESCO added the historic centre of Krakow to the list of World Heritage Sites.

Deadline for submission of abstracts: 1 December, 2008.

Deadline for proposals for structured sessions: 1 November 2008.

Please come and join us! Visit www.icsv16.org

Marek Pawelczyk
Chairman of the ICSV16 Local Organising Committee
IIAV Vice-President for Communications

Malcolm J. Crocker
Chair of the ICSV16 International Scientific Committee
IIAV Executive Director

Ladies and Gentlemen,

The British Institute of NDT (BINDT) is a 3rd party certification body providing certification for professionals in NDT and condition monitoring (CM).

Given the developments of CM and asset management in the key industries of manufacturing, petrochemical production and distribution, aerospace and maritime, the Institute wishes to announce a proposal for a petrochemical-CM/NDT conference based in the Middle East, preferably Dubai, in the autumn of 2009. This conference will encapsulate all oil producing regions of the world, not just the middle east. Other Sector specific conferences will also be considered in the near future.

In order for me to progress this proposal I require your support, in writing, or at least 'expression of interest', indicating that you would be interested to receive further information on this conference and to be considered as a delegate and/or speaker to present a paper.

The first objective of this conference is to engage condition monitoring and NDT companies [service providers, end-users, equipment suppliers, trainers] and asset management companies who provide into the petrochemical sector, in any way, and gain full support for BINDT as the principal 3rd party certifying body for professionals and technicians gaining qualifications against the new condition monitoring standard, ISO18436. The second objective, following all presentations, is to gain support for this new standard as a 3rd party qualification by all companies, by acknowledging its

merit and then hopefully specifying it into company policy. The conference will be a vehicle to bring all companies together to discuss such issues, including:

- Condition monitoring technologies (testing, monitoring, training)
- Non-destructive testing (testing, training)
- Petrochemical operations (design, construction, implementation, management and maintenance (testing, monitoring, training)
- Environmental (counter-measures, new technologies)
- Alternative fuel/power technologies (R&D, testing, implementation)
- Petrochemical Engineering and Infrastructure Asset Management
- Whole life cycle costing (WLCC) and OEE in the petrochemical industry
- Safety
- The worlds future

I trust you will see the vision of this proposed conference and offer your support by way of presenting a paper or attendance.
Kind regards

Stephen Roe

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In St Louis I met a really delightful guy, Pierre Diakonoff from France, we spent most of our free time outside the meetings together but in the meeting we didn't have much in common except that both of us thought it was terribly boring. He made frequent use of his Nokia phone/camera and he posted several sequences on www.dailymotion.com. "I miss an ISO representative in this meeting" he said after the meetings were over – That how it started. I began to write a letter to Franck Perrad, in the ISO Central Secretariat in order to tell him what I thought about it. But I also knew that I had to write an article in SVIB Nytt about it and that's why this report has the form of a letter to whom it may concern.
Alf Olsson



Pierre Diakonoff

Resolution 22 of - ISO TC 108 Mechanical vibration, shock and condition monitoring.

You will see from the resolutions of ISO Technical Committee 108 that Sweden, that's me being as well the chairman of TC 108 SC 2 Measurement and evaluation of mechanical vibration and shock as applied to machines, vehicles and structures, voted negative on 3 occasions.

Resolution 2 was inspired by TC 108 working group 23 Vibration and shock isolation which, as read from its report of meeting, have no work item and only two participants, the convener from France and one delegate from Japan. As a result of their meeting they came up with a proposal for TC 108 to decide on a new preliminary work item on "Technical information to be exchanged for application of vibration isolation of buildings". This was agreed by the committee in spite of the fact that there was no rationale or any document in support of this blank title. I pointed it out and the secretary noted "Sweden opposed" under the resolution.

Since when has it become standard procedure for a Technical Committee, TC, to pick up work items from its subcommittees? Vibration of Buildings and Structures has always been in the scope and programmer of work for Sub Committee 2.

I ask you this because several years ago Brian Ennever, retired from BSI for many years, sent us a British proposal for a new work item on "Conditions monitoring of buildings". He addressed it to the secretariat of SC 2 with a copy to the TC 108 secretariat. We answered him that, since there was only a couple of months to go until the next SC 2 meeting at Odense Skiftswerft in Denmark, he had to wait for our answer until after the meeting. Shortly before that the TC 108 secretariat, however, circulated the new proposal, NP, as an item of work for the TC. I was terribly upset when I wrote to the Chairman after I had learned about it and I have never really accepted his answer. He said that - I have lifted this work item up to a level above the SC 2 and SC 5 Condition Monitoring and Diagnostics of Machines, which are in conflict with each other -. The scope of SC 5 is limited to "Machines". It has nothing to do with buildings. The

Chairman of SC 5 and I myself of behalf of SC 2 assured the Chairman of TC 108 at the following meeting in Copenhagen that there was no dispute whatsoever between the two SCs. There was enough work for everybody said Prof Joe Matthew and we conducted each our part of it. I remember that Bruce Douglas, chairman of TC 108, looked a bit disappointed not having any use for his expression "turf war" that he seemed so fond of. The whole matter was nevertheless very embarrassing but we let it pass. The reason I now bring this up again is was one of several incidents that divided the experts on building vibration between going to either SC 2, as they were used to, and/or to the TC to attend meetings dealing with the same kind of tasks and it has unfortunately proven to be fatal for both committees.

The same expert from France, now the convener for WG 24, presented after his report for WG 23 to commence work on "Classification of environmental vibration conditions". This is not only outside the scope of TC 108 but also in direct in conflict with the scope of IEC TC 104 Environmental conditions, classification and methods of test - of which I happen to be the Secretary. This draft resolution (4) was however withdrawn after long discussions. The chairman promised nevertheless to support it again if and when the convener had produced some kind of documentation on it.

I will meet with TC 104 in Oak Ridge 17 to 21 November, that's partly the reason I could make it to both of these meetings, and I will report on this incident. I will furthermore urge the experts in TC 104 to get the revision of the dynamic classes of the IEC 60721-series Classification of environmen-

tal Conditions - Environmental parameters and their severities moving, so that we can show the world of standardisers that there is a valid database and a set of suitable environmental classes for the description of the dynamic - vibration - environment not only in buildings but also in vehicles, ships and storage in weather protected and non weather protected areas etc.

Another proposal for new work for WG 24 was brought up by the same French expert this time on "Parameters to be specified for shock measurements". It was agreed in spite of yet another negative vote from Sweden and again - this is a building related work item. The French expert Mr. Tantawy is well known in SC 2. He is not only the convener of the two working groups of TC 108 but also the convener of SC 2 WG 3 Vibration of Buildings. This WG has at present one task, to revise ISO 4866 Mechanical vibration and shock - Vibration of fixed structures - Guidelines for the measurement of vibrations and evaluation of their effects on structures. WG 3 cancelled its last meeting because no one signed up for it and I can assure you it was not because of the time and venue - April in Paris. Once the revision of ISO 4866 is finalised, the chairman of SC 2 and I remind you that's me, intend to disband WG 3. The remaining active working groups on buildings and structures are then SC 2 WG 8 and WG 16. SC 2 will once again take up work on vibration in buildings and structures in new working groups once we have a well documented proposal. In Sweden we don't have to go far to find one. Our Norwegian colleagues are working on it and so are we.

This brings me to - resolution 22 - "As a result of discussion at the Chairman's Advisory Group meeting, the Chairman is charged with exploring the option of creation of new subcommittees on "Dynamics of machines and rotor dynamics" and "Dynamics of structures and vehicles" and the option of reallocation of some of the existing working groups within new SCs." The word "option" was inserted in two instances after a request by the German head of delegation who started off saying that he was astonished to see resolution 22 after what the Chairman had said in the foregoing meeting in the advisory group, but that he could live with it as changed.

This is a resolution of the kind I remember from the time before the creation of SC 5. The last time TC 108 decided to review its organisation was at a meeting in Milano in 1991. I was a member of that group and we met later that year in Houston together with WG 17 Condition Monitoring and Diagnostics, CM&D. The TC Secretary went right away and fired the Chairman Bob Bartheld after that reorganisation meeting and the former chairman Prof. Douglas Muster, whom we had just left in his home in Houston was reinstated to lead TC 108 and the meetings to come in Kyoto 1992 and London 1993 during which SC 5 was created. Prof. Muster had to resign after the London Meeting. I took part in that process. I knew what was happening. I considered the question of the Chairmanship as an entirely internal American affair but the division of work and experts between the new SC 5 and the existing SCs was the main issue and in the end I took a standpoint defending the scope and programme of work of SC 2. That's were we

are today. Vibration condition monitoring is today a part of the work in SC 2 because the experts decided to stay in SC 2. Even the former chairman Paul Maedel of ANSI S2 was agreed with this.

Resolution 22 – is a direct reaction on the questions we discussed June in Orlando. Looking back I am very pleased to have been present at both these meetings here in the USA. In June this year there were meetings in Orlando with SC 2 WG 1 Vibration of machines, WG 10 Basic techniques for vibration diagnostics of machines and the joint IEC TC 4 and ISO TC 108 SC 2 WG on Vibration of hydraulic machine sets. They met together with TC 108 WG 31 Balancing. There were about 40 experts present. It was good meetings hosted by Siemens and Orlando was a most delightful place to meet in. Here in St Louis there were about 25 people attending both TC 108 and its remaining 6 working groups and the chairman's advisory group as well as the SC 3 meeting with its 2 working groups.

In Orlando we learned that the convener of SC 2 WG 1 Mr. Mike McGuire, UK was going to retire. He suggested Mr. Rob Herbert, the convener of TC 108/WG 31, as his successor. These two WGs have several work items on each of their agendas, the size for a Subcommittee in fact, and several experts in common. The proposal made by Rob Herbert to create a subcommittee on Rotordynamics was of course discussed unofficially in Orlando but BSI was not able to support it and as an alternative I suggested that DIN, if requested, might be able to take over WG 31 from TC 108. Nothing has changed since then in Orlando to here in St Louis. BSI is still not prepared to finance the secretariat

of a recreated and enlarged SC 1 on Rotordynamics and DIN has not yet received any request to take over WG 31. Ms Blaeser, the secretary of TC 108 said however at the advisory meeting in St Louis that she didn't mind and that she had enough to do even without WG 31. The Chairman nevertheless asked the experts and representatives of MBs attending the meeting if they, without making any commitment, supported the proposal to create a new SC on Rotordynamics. Almost everybody did, even I to some extent because I can see the merits of Rob Herbets proposal but it's a British proposal and it is still not financially supported. The US member recently withdrew its support to the former SC 1 Balancing which was disbanded and the work was continued in WG 31.

TC 108 has today 42 working units of which 6 are SCs.

SC3 and SC6, have in fact only one WG each.

The convener of SC 3 WG 10 resigned shortly before this meeting.

The SC 3 chairman convened WG 10.

SC 6 cancelled the St Louis meeting in September.

TC 108 have asked if IEC TC 104 can take over the work of SC 6.

SC 2 and SC 4 have both a German secretariat, DIN.

The work is conducted in 9 plus 5 totally 14 WGs.

SC 5 has 13 WGs.

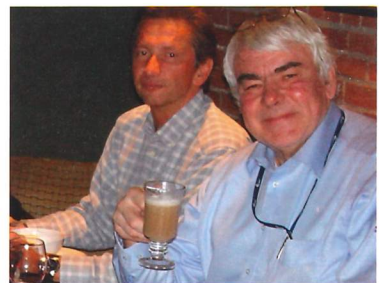
The Norwegian MB have requested that SC 5 be turned into a separate TC.

In spite of this the Chairman of TC 108 insists on reorganising the committee. Why? You never know what happens with a pro-

posal to create new SCs. It may very well be approved once you circulate it for voting and then what happens? A new SC on Rotordynamics would probably expect to take over SC 2 WGs 1, 7, and 9. SC 5 will no doubt insist on taking over WG 10. WGs 3, 8 and 16 would naturally belong to the new SC Structure dynamics leaving SC 2 with only WG 2 Vibration of Ships.

This is in my mind what Resolution 22 is all about. It is not aiming at solving any organisational problem. It will only create hostility and new problems and it is directly intended to destruct a well functioning and productive SC 2. In fact the Chairman stated at the very beginning of the TC 108 meeting that "TC 108 was a healthy committee" and he had figures to prove it.

We have come long way. The secretary Dieter Hansen, DIN, I and others involved in SC 2 and its work will have to come up with some answers and a line of action before the next SC 2 meeting in London in March next year. I will request the ISO Central Secretariat to be present at that meeting and for the first time of my 15 years as chairman, as much as I regret it, I will ask the secretary to extend the time allocated for the SC 2 meeting.



*Alf Olsson
Chairman of ISO TC 108/SC 2.*

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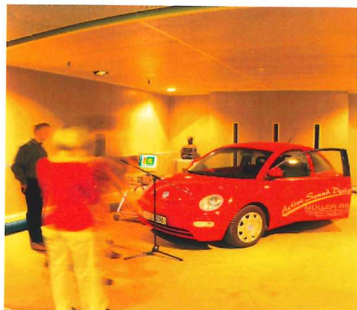
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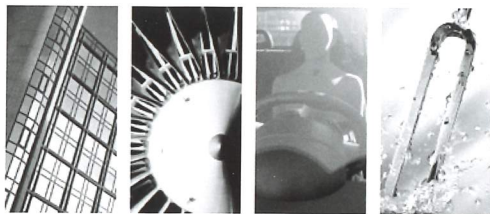


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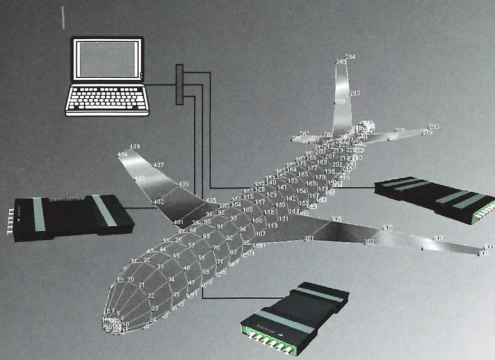
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